

SYSTEM BUCKYDIAGNOST FS ISORAD

LIST OF DOCUMENTATION IN THIS BINDER:

- SUBSYSTEM MANUAL BuckyDiagnost FS IsoRAD
- UNIT MANUAL manual/automatic collimator

Note: indicates document present

Philips Medical Systems

SERVICE MANUAL
704
SUBSYSTEM

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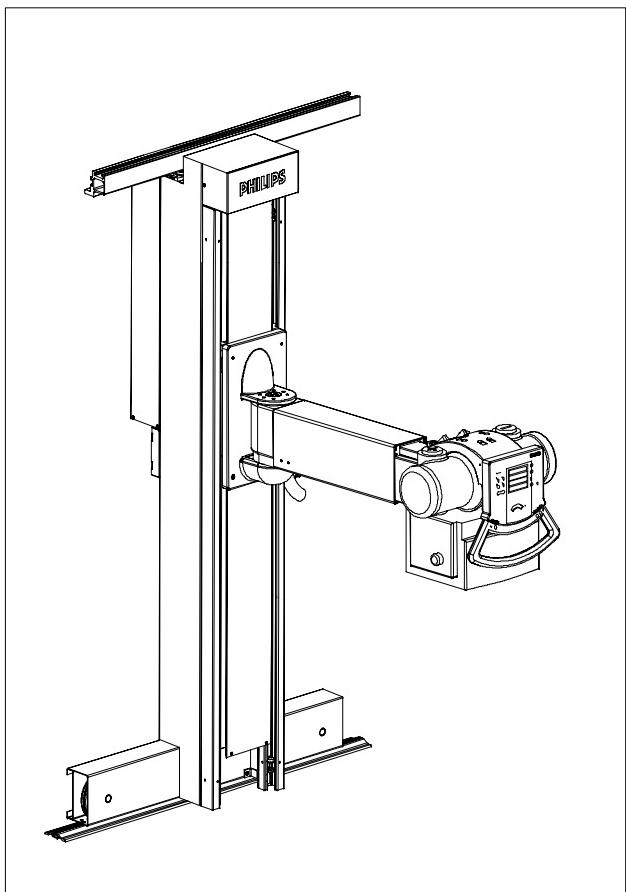
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DMC Hamburg

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4512 984 28681 REV AA
BD_FS_IsoRAD_reg

DRAWINGS

Z

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WIRING DIAGRAMS

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SERVICE MANUAL - SUBSYSTEM

BuckyDiagnost FS IsoRAD

Author: M. Bierstedt

Type No : 9890 010 83921

In case there are any questions concerning this manual,
please send this LOPAD via fax to 49/(0)40/5078 2481

File: BD_FS IsoRAD_28681AA

List of pages and drawings (LOPAD)

Manual Order No: 4512 984 28681
released: 09/2004

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INTRODUCTION AND TECHNICAL DATA

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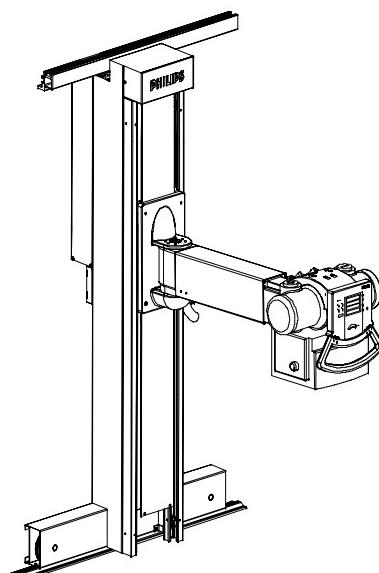
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1. Introduction and technical data

1.1. Purpose of the manual

This documentation is valid for BuckyDiagnost FS IsoRAD (FS = floor stand).

The floor stand IsoRAD is part of the BuckyDiagnost IsoRAD system (shelter version).



The FS IsoRAD has a special design and is not available for other systems of the BuckyDiagnost family.

1.2. Items supplied

FS IsoRAD

- Column with weight counter-balanced holder for X-ray tube assembly
- Long tube carrier arm, extendable
- Control handle option
- Automatic collimation and cassette size sensing
- Rail system, floor mounted
- High-voltage cable, length depending on shelter
- Installation cable, length depending on shelter

1.3. Compatibility

The **BuckyDiagnost FS IsoRAD** is compatible with the following components:

- Control handle options
- Automatic collimator (Nicol)
- SRO 2550/ROT 350
- Set of cables standard (various lengths)
- Set of cables options (various lengths)
- Set of parts for sensing
- Set for cassette size sensing

Compatibility with other subsystems:

- Generator OPTIMUS RAD US
- BuckyDiagnost VE
- BuckyDiagnost TH2

1.4. Technical data

1.4.1. Mechanical data

For information about mechanical data refer to chapter Z 'Drawings'.

1.4.2. Environmental data

	Operation	Stock / Transport
Temperature in °Celcius	0 / + 40	- 40 / + 75
Temperature in °Celcius / Hour	N/A	N/A
Humidity in % (non-condensing)	5 / 95	5 / 95
Gradient in % / hour	N/A	N/A
Vibrations / Shock range in Hz	5 – 500	5 – 500
Vibrations / Shock amplitude in mm	N/A	N/A
Vibrations / Shock acceleration in g	0.25 peak	1.0 peak
Shock acceleration in g	5 peak	10 peak
Shock pulse duration in msec	11	11
Air pressure in Hecto-pascal	700 / 1100	700 / 1100

- Acoustic noise level : N/A
 Air cooling : N/A
 EMC : IEC 950

1.4.3. Electrical data

Equipment related:

Power required	:	max. 600 VA
Nominal voltages	:	230 VAC
Supply configurations	:	230 VAC
Voltage variation	:	N/A
Voltage impulse	:	N/A
Voltage surge	:	N/A
Voltage sag	:	N/A
Static frequency variation	:	50 or 60 Hz ± 1 Hz
Dynamic frequency variation	:	N/A
Harmonic voltage distortion (single, total)	:	N/A
Neutral to ground voltage variation	:	N/A
Neutral to ground voltage impulse	:	N/A
Nominal current	:	standby (50/ 60 Hz) 0.5/ 0.6 A maximum current (50/ 60 Hz) 2.3 / 2.6 A
Nominal frequency	:	50 Hz / 60 Hz
Heat emission		
standby	:	N/A
in operation	:	N/A

Operating voltages:

230 VAC +10 ... 15%

1.4.4. Tools / Material required

The FS IsoRAD is already installed and aligned in the shelter.

For replacement activities see chapter 4.

1.5. Safety information

The general legal and factory safety recommendations for this X-ray equipment and the following recommendations must be strictly observed!

Start of installation, operation and maintenance work and especially electrical work must only be executed by trained and authorized persons. This equipment must only be serviced by properly educated service specialists who have received general and system-specific training as performed by Philips Medical Systems.



WARNING

The system/component must be switched OFF during replacement work. Any X-ray unit produces ionizing radiation which may be harmful if not properly controlled. Therefore, it is recommended that this equipment be operated in accordance with the guidelines set down by the national council on radiation protection.



WARNING

The light source of the light pointer is a Class II laser. Never look into the beam directly.

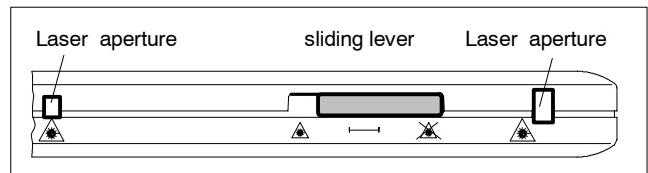
With Class II lasers the eye is protected from brief,

random glances into the laser beam by the eyelid closure reflex.

Class II lasers may therefore be used without taking any further

precautions provided it is necessary neither to intentionally look into the beam for a period longer than 0.25 s nor to repeatedly look into the laser beam or directly reflected laser beam.

For continuous duty Class II lasers the maximum limit for accessible radiation is 1mW. The laser light is emitted from openings in the lower side of the controlhandle. The laser apertures are marked by the yellow/black laser triangle in close proximity to the laser aperture.



1.6. Compliance information

N/A

1.7. Equipment identification and labeling

Refer to drawing 2Z-10.

1.8. Abbreviations and definitions

Abbreviation	Explanation
BIST	Build-In Self Test
FS	Floor Stand
PMS	Philips Medical Systems
POST	Power-On Self Test
PRD	Product Reference Data
RO	Rotalix
SID	Source Image Distance
SRO	Super Rotalix
TC	Tool Code
TF	Table Fixed
TH	Table Height adjustable
VE	Vertical
VR	Vertical Radiography
VT	Vertical Tilttable

1.9. Manual history

Date	Version	Name	Reason of changes
16.08.04	1.0	M. Bierstedt	

1 Installation

The FS IsoRAD is already installed and aligned in the shelter.

For replacement activities refer to section 4.

1. Fault finding

Use manual SMCM BuckyDiagnost TH2, manual
Code No. 4512-984-2565x.

REPLACEMENT

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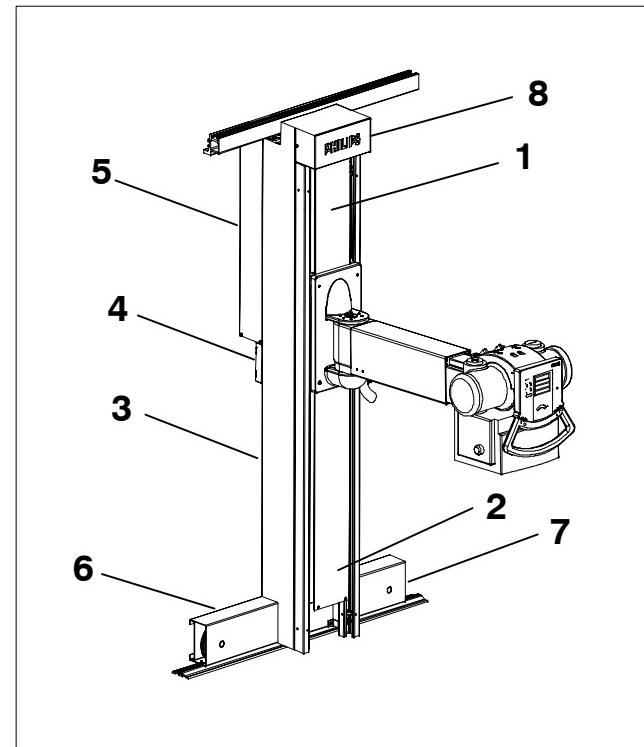
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1. FS IsoRAD

1.1. Overview over the covers

When performing the replacement procedures, the following covers may be affected:

- 1 = Column front cover top
- 2 = Column front cover bottom
- 3 = Rear bottom cover
- 4 = Cable support cover
- 5 = Electronic rack cover
- 6 = Column base rear cover
- 7 = Column base side cover, rear
- 8 = Column top cover



1.2. Carriage

1.2.1. Replacement of the longitudinal brake

Code No. 4512 131 2172.

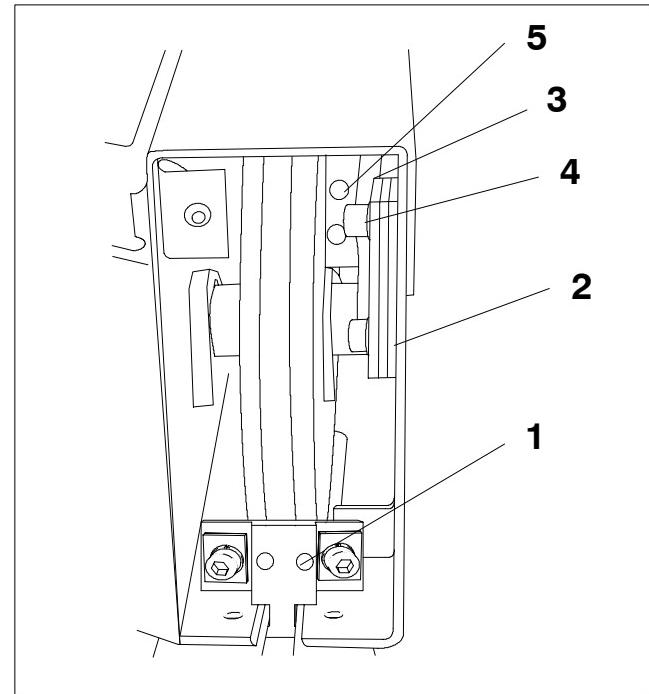
	Replacement of the longitudinal brake	
1 h		

- Switch the system OFF.
- Remove the column base rear cover and the column base side cover, rear (6, 7) of the carriage.
- Remove the rail anchor (1) with an Allen key.

Note

Remember the order of the distance plates.

- Remove the distance plates (2).
- Loosen the clamp (3).
- Disconnect the cable (4).
- Remove the brake (5).
- Install the new brake.
- Connect the cable (4).
- Fix the clamp (3).
- Adjust the brake.
- Install the rail anchor (1).
- Ensure that the wheel runs free.
 - If not, change the position of the distance plates.
- Re-install the cover.



1.2.2. Replacement of the rear wheel

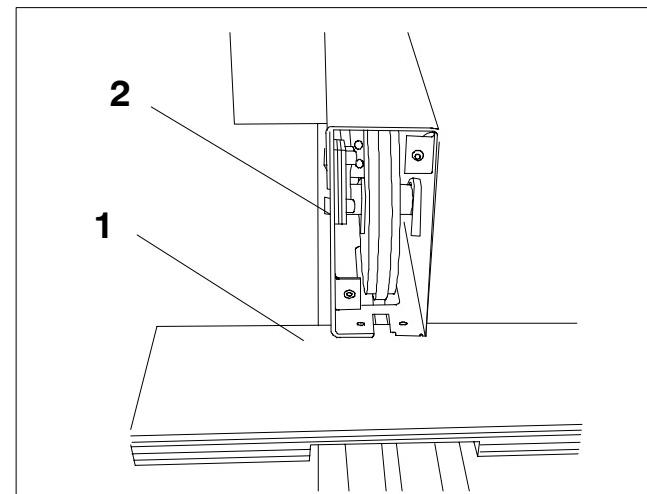
Code No. 4512 133 0418.

	Replacement of the rear wheel	
1.5 h		

Note

If one rear wheel is defective, check and ensure the good condition of the other one.

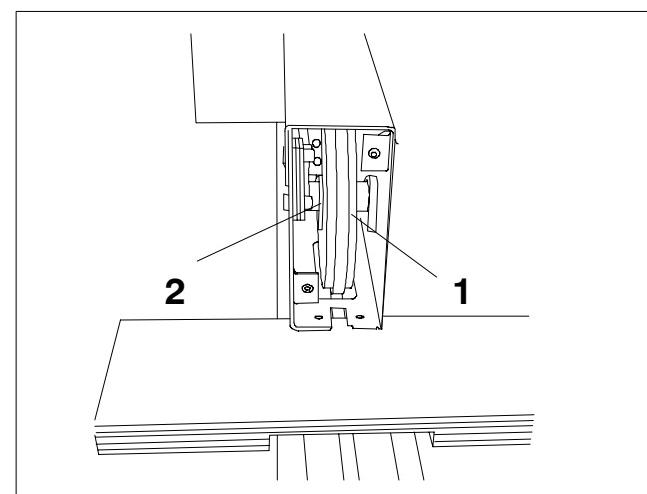
- Remove the brake. Refer to chapter 1.2.1 "Replacement of the longitudinal brake".
- Lift the floor carriage some millimeters so that the rear wheel runs free.
- Fix the position, for instance, with a wooden bar (1).
- Remove the screw M6 (2) with an Allen key.



Note

Keep in mind the order of the distance rings on the mandrel.

- Remove the mandrel (1).
- Remove the wheel (2).
- Place the distance rings in correct order and the new wheel on the mandrel.
- Insert the mandrel and fix it.



Note

Ensure that the order of the distance plates of the brakes is correct.

- Install the brake according to chapter 1.2.1 "Replacement of the longitudinal brake".
- Install the anchor rail.
- Re-install the covers.
- Check the functions.

1.3. Long tube carrier arm, extendable

1.3.1. Replacement of the complete arm

Code no. 4512-131-8753.

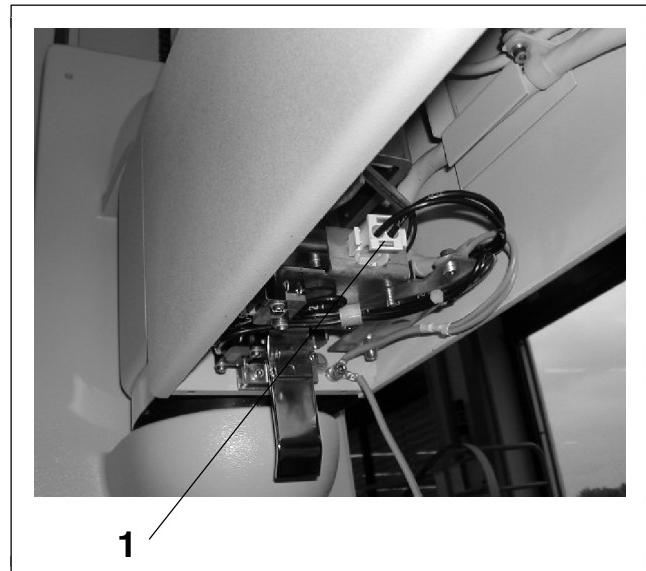
 4 h	Replacement of the complete tube carrier arm	
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1.3.2. Replacement of the base plate installed micro switch

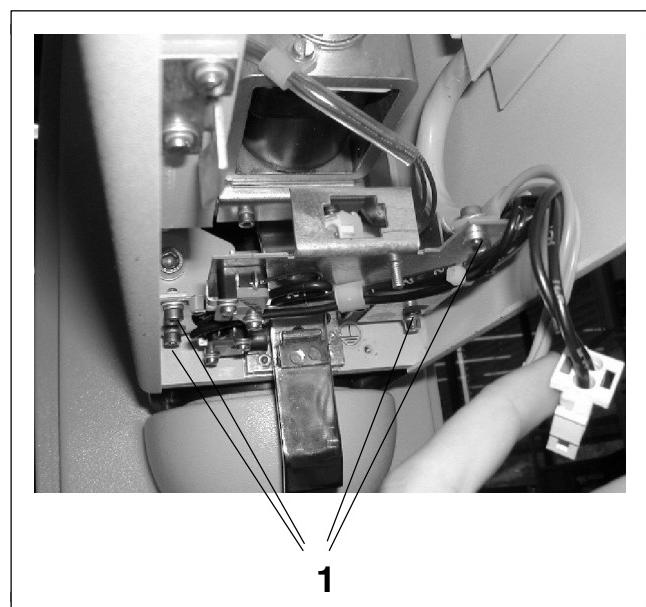
Code no. 4512-133-0544.

 0.5 h	Replacement of the base plate installed micro switch	
--	---	--

- Remove the cover at the bottom of the tube carrier arm.



- Loosen the four screws (1) and replace the base plate installed micro switch.
– Ensure the correct function of the micro switch.



- Check the function of the system.
- Re-install the cover.

1.3.3. Replacement of the catch**Code no. 4512-133-0452.**

	Replacement of the catch	
0.5 h		

- Remove the cover at the bottom of the tube carrier arm.
- Remove the base plate installed micro switch according to chapter 1.3.2.

- Remove the screws (1) and replace the catch.

- Install the base plate installed micro switch according to chapter 1.3.2.

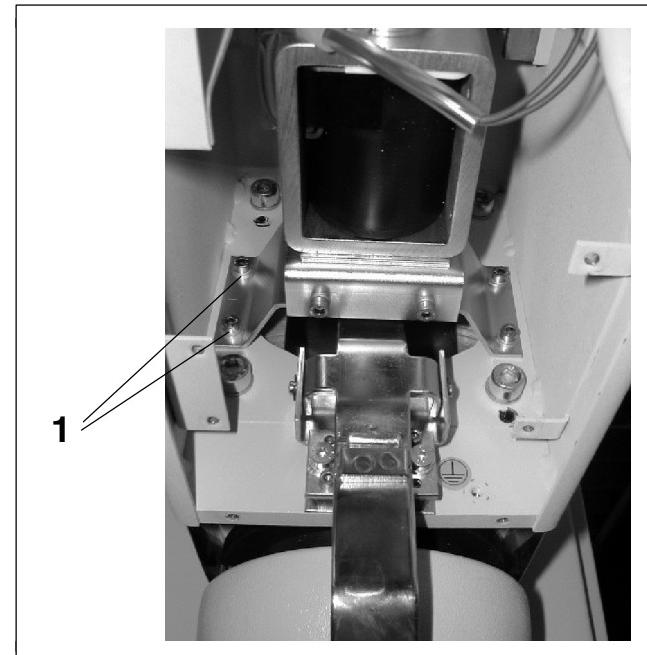


1.3.4. Replacement of the magnetic unit

Code no. 4512-133-0584.

 0.5 h	Replacement of the magnetic unit	
---	-------------------------------------	--

- Remove the cover at the bottom of the tube carrier arm.
- Remove the base plate installed micro switch according to chapter 1.3.2.
- Loosen the four screws (1) and replace the magnetic unit.
- Install the base plate installed micro switch according to chapter 1.3.2.

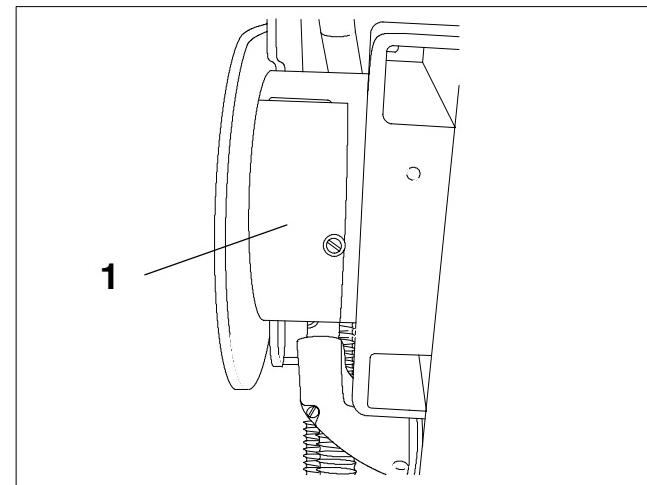


1.3.5. Replacement of the alpha switch plate

Code No. 4512 13 1441.

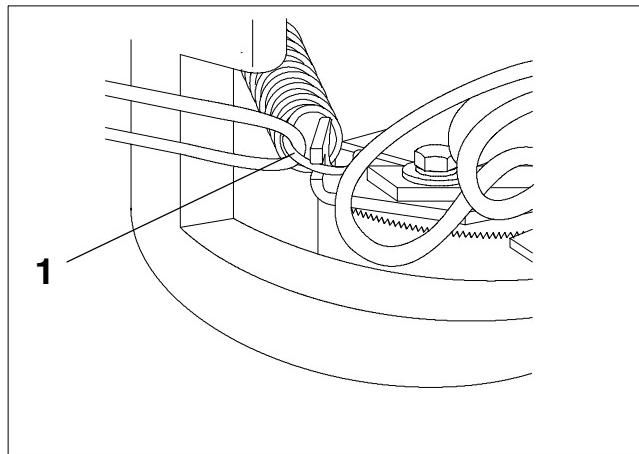
 1 h	Replacement of the alpha switch plate	
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- Switch the system OFF.
- Turn the control handle clockwise to its end position.
- Remove the cover (1).

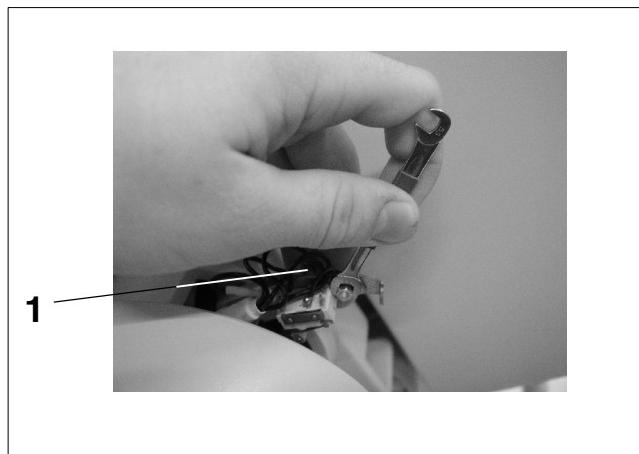


Use a wire and pliers for easier handling of the tension spring.

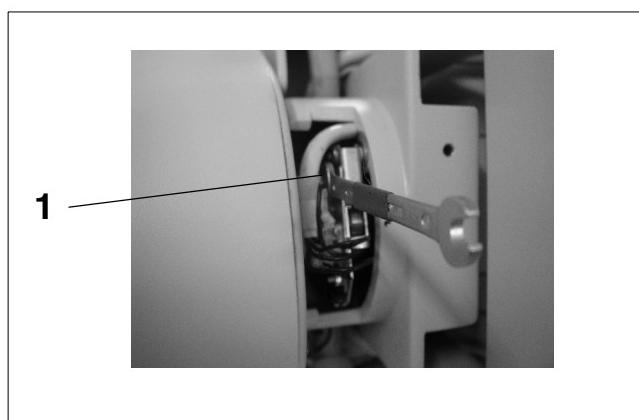
- Unhook the spring at its top (1).



- Remove the nut (1).



- Remove the upper screw of the alpha switch plate (1)



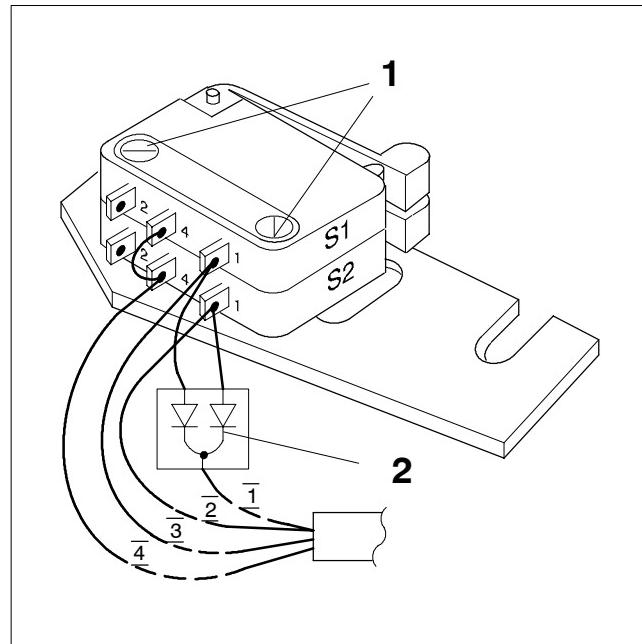
- Pull out the alpha switch plate and remove the wires.

Note

Do not touch the fixing screws (1).

- Solder the new alpha switch plate at the wires according the following table.
 - Pay attention to the diode (2).

Labeled wires connected to:		
UEX4:02	1	to the cathode of both diodes
UEX4:08	3	to UFA S1:1
UEX4:09	4	to UFA S1:4
UEX4:04	2	to UFA S2:1



- Insert and fix the alpha switch plate.
- Hook the spring.
- Switch the system ON.
- Ensure the 0°, +90° and -90° positions at control handle according to table.
 - The LED light is on only in 0°, +90° and -90° positions.

S1	S2	degree
ON	ON	0
ON	OFF	+90
OFF	ON	-90

- Re-install the cover.

1.3.6. Replacement of the transverse brake

Code no. 4512-130-7291.

 1 h	Replacement of the transverse brake	
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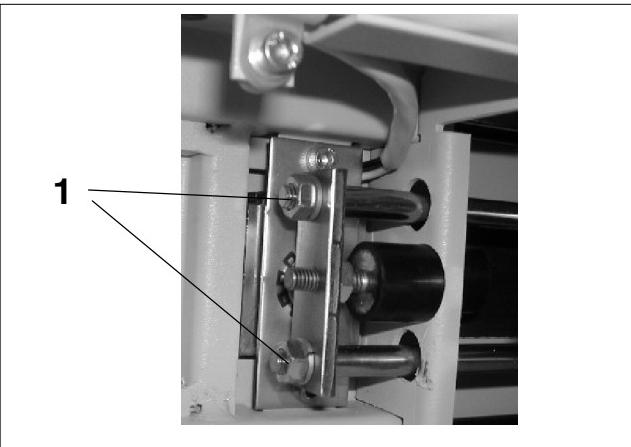
- Switch the system OFF.
- Remove the bottom cover of the tube carrier arm.

- Pull out the tube carrier arm to its maximum size.

**Warning!**

If the end stopper is removed the tube carrier arm can fall down. Secure the tube carrier arm, e.g. by lifting the table.

- Remove the end stopper by loosening the screws (1).

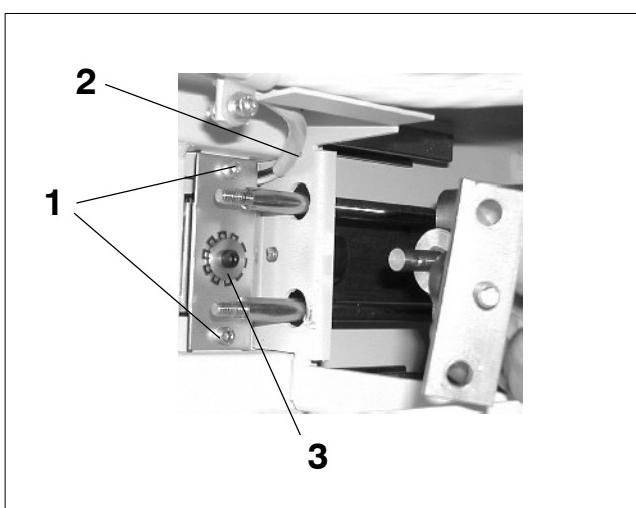


- Remove the screws (1) from the brake plate.

Note

Keep in mind the positions of the cable!

- Remove the cable (2).
- Replace the brake (3) at the brake plate.
- Solder the cable.
- Fix the cable at the tube carrier arm.
- Fix the end stopper.
- Check the function of the brake.
- Re-install the cover.



1.4. Control grip

1.4.1. Replacement of the PCB control handle CU2

Code no. 4512-108-0718.

Note

After replacement of the CU2 proceed height adjustment. Refer to chapter 10.2 'Adjustment of the ceiling suspension height' in manual X-Scope.

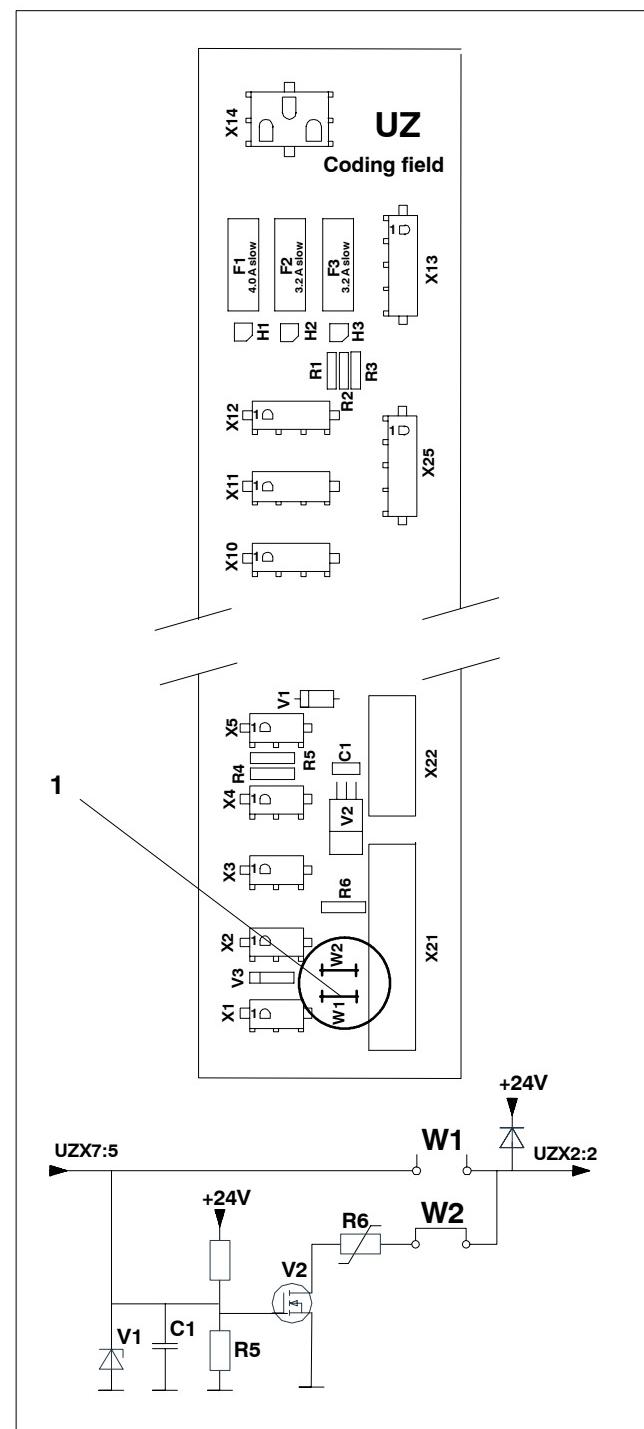
 1 h	Replacement of the PCB on the control handle	
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1. Programmings

1.1. Hardware

Programming of the UZ field 4512 108 0738x:

- Open link W1 (1).



1.2. Software programmings with X-Scope

Refer to manual X-Scope in SRM BuckyDiagnost FS IsoRAD.

ADJUSTMENTS

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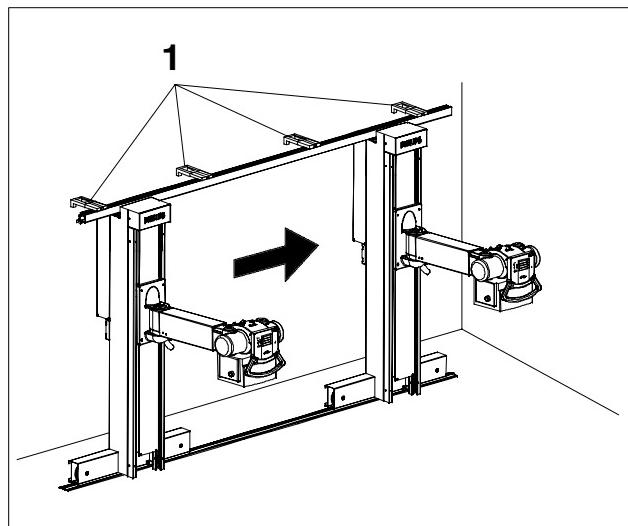
1. Adjustments

1.1. Alignment check of the column

Note

The IsoRAD shelter has to be leveled first before aligning the Bucky Diagnost FS IsoRAD.

- Move the column to the left end position.
- Check the alignment of the rails with a spirit level by moving the column smoothly to the other end. The column must remain steadily upright over the whole length.
- If necessary, adjust the level with the parking devices for the top slide rail (1).



1.2. Centering the system

- Switch the system **ON**.
- Fix the table bucky into the **system center position**.
- Switch **ON** the simulation light.

The cross line from the collimator and the cross line of the grid should coincide. If necessary position the catch plates.

1.3. Alignment to the table

Note

Check the correct alignment of the table! Refer to Subsystem manual BuckyDiagnost TH2, section Installation, chapter 2.

- Check the alignment of the system.
 - Lift the FS to the lowest position.
 - Lift the FS to the highest position.

The cross should not vary more than ± 2 mm per meter off the center.

If the cross lays out of the center of the collimator:

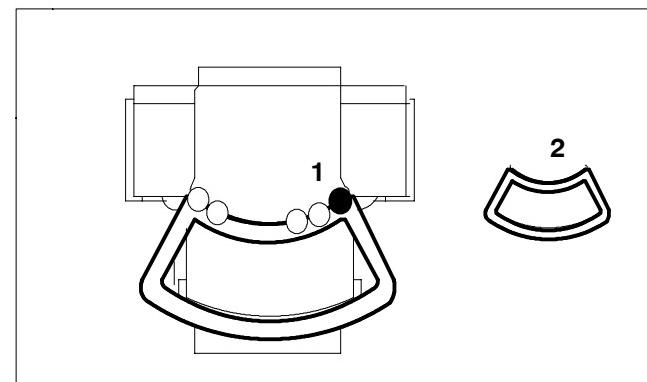
- Align the tube by loosen screws at the holder or of the tube. Respect the direction of vary.
 - Fasten screws, then repeat procedure.
- Remove the mirror.

1.4. Laser alignment

Note

Check the alignment of the laser light with the collimator light field. If the laser light is not centered to the collimator light, proceed with the following steps:

- Position the control handle on $\alpha = 0^\circ$ position, the LED (1) = **ON**.
- Remove the control handle grip (2) on the rear side by loosening screws and nuts

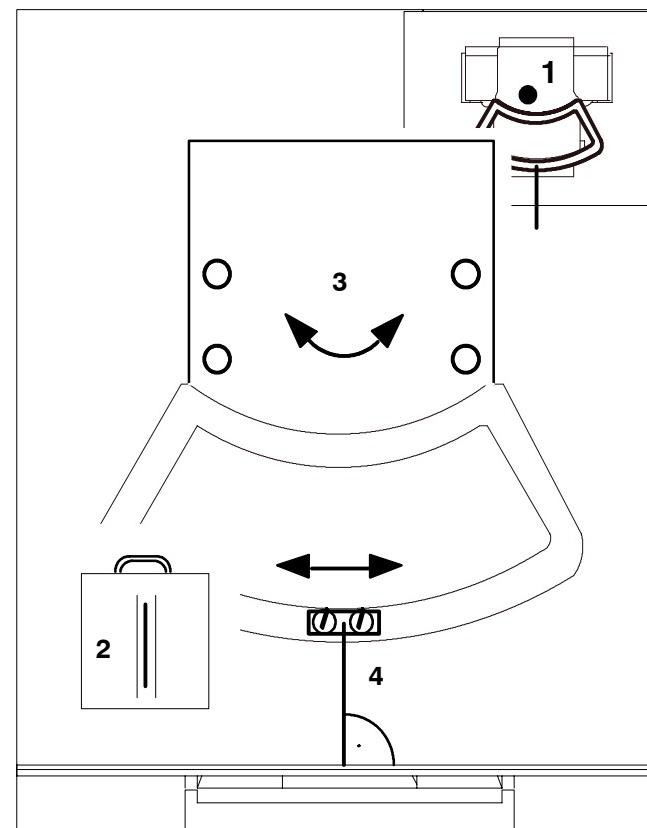


1.4.1. Center laser alignment

- Press button (1)
 - The center laser and the diaphragm light are **ON**.
- Raise the table top up and down.
- Observe the center laser light on the table top.
 - If the beam wanders (2), rotate the control handle by loosening four screws (3) on the rear side
- Tighten screws, then repeat procedure.

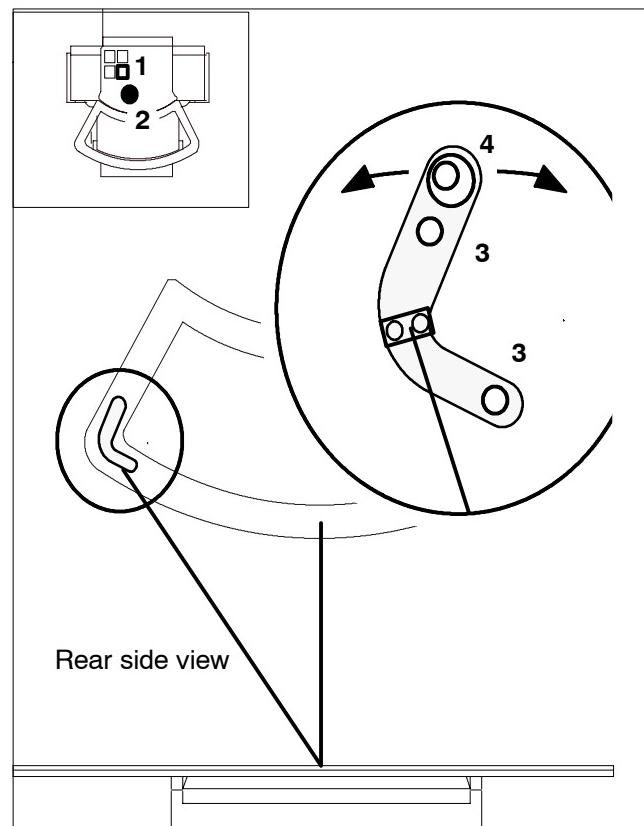
Fine Adjustment:

- Loosen the two fixing screws (4) of the center laser.
- Adjust the laser.
- Tighten the two fixing screws (4).



1.4.2. SID laser alignment

- Select the RGDV4 for free exposure (1), see **SID-Selection with Program X-Scope**, function **None** should not be selected!
- Ask the operator for the preferred SID. The default pre-adjustment is SID = 1100 mm.
- Raise the table top into the preferred value of the SID = 900 ... 1200 mm.
- Press button (2) = center laser and pulsing SID laser and diaphragm light are **ON**.
- Observe the center laser and the pulses SID laser on the table top.
 - If the beams are not merged, loosen the two fixing screws (3) and adjust the SID laser with the eccentric screw (4).
 - Tighten the two fixing screws (3).



1.4.3. Final work

- Install the removed control handle grip on the rear side

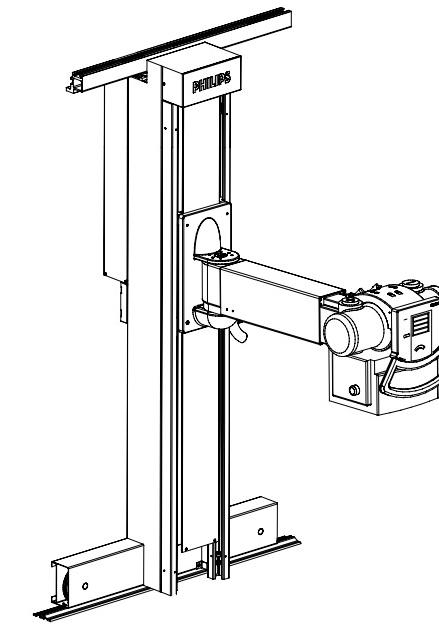
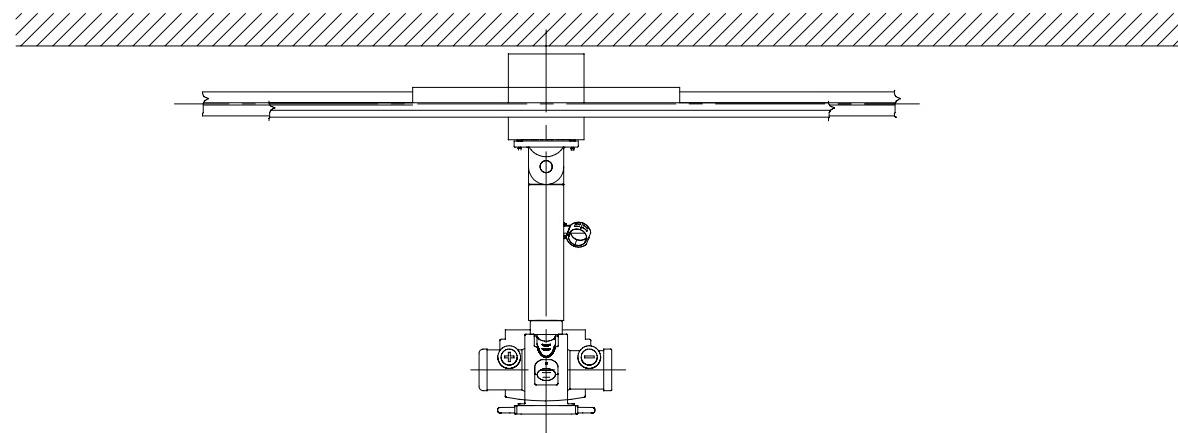
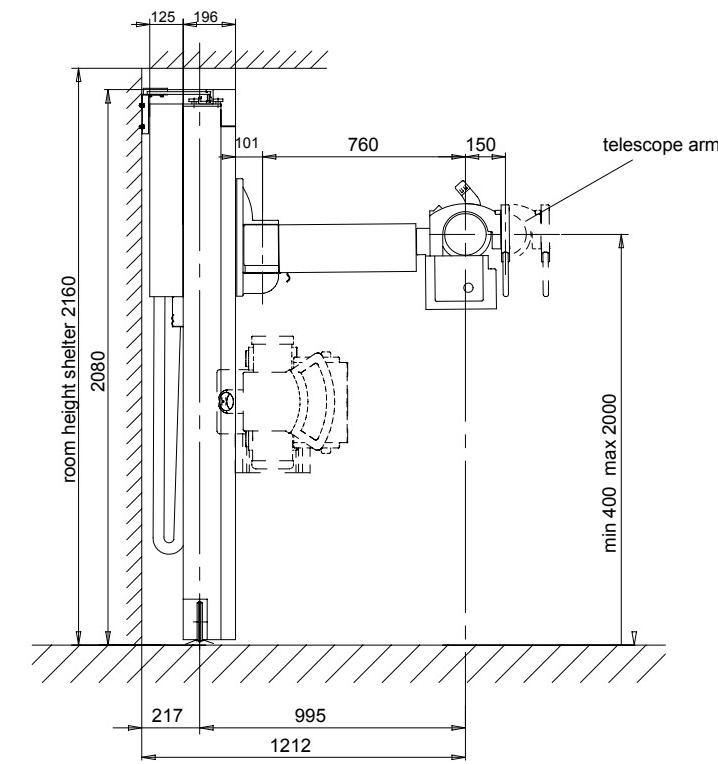
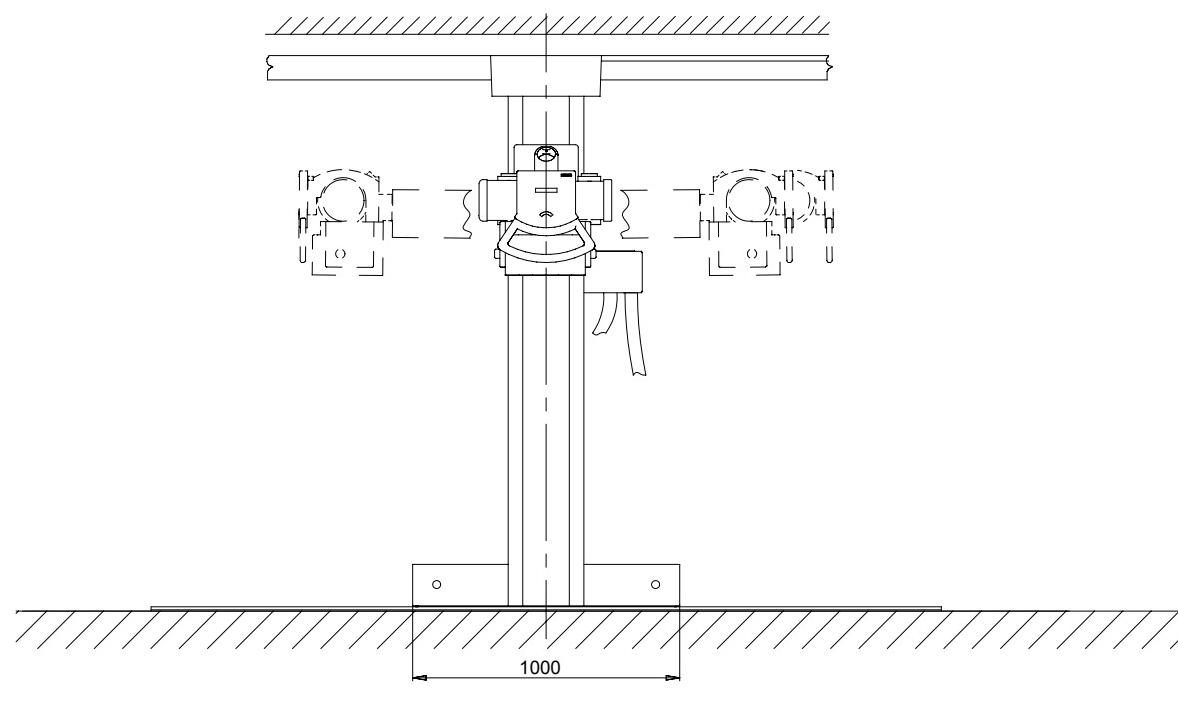
Note

Pay attention to the laser wires, that they are not damaged by attaching the grip! If necessary, fix the wires with adhesive tape.

Drawings

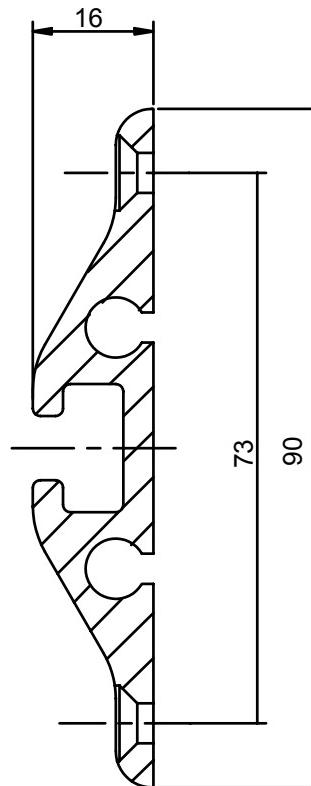
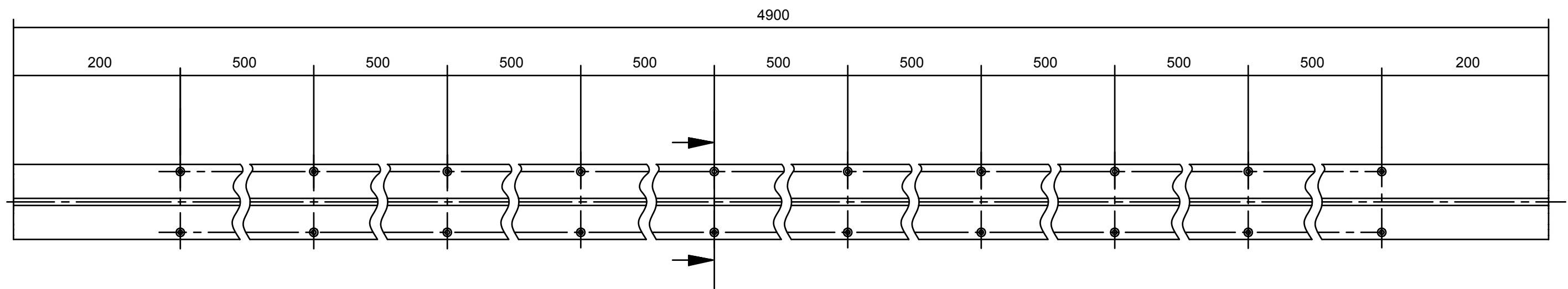
FS Standard mechanic

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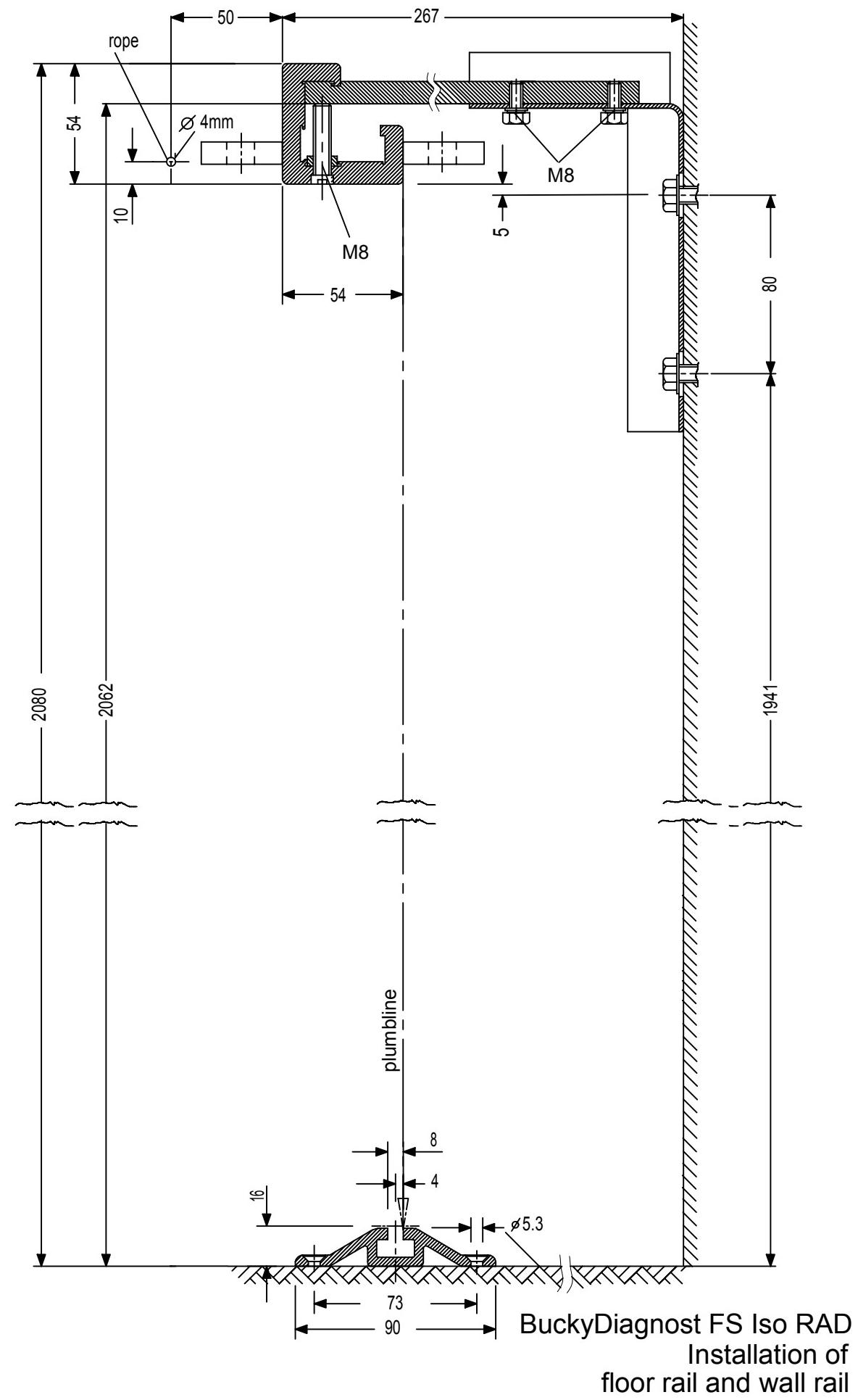
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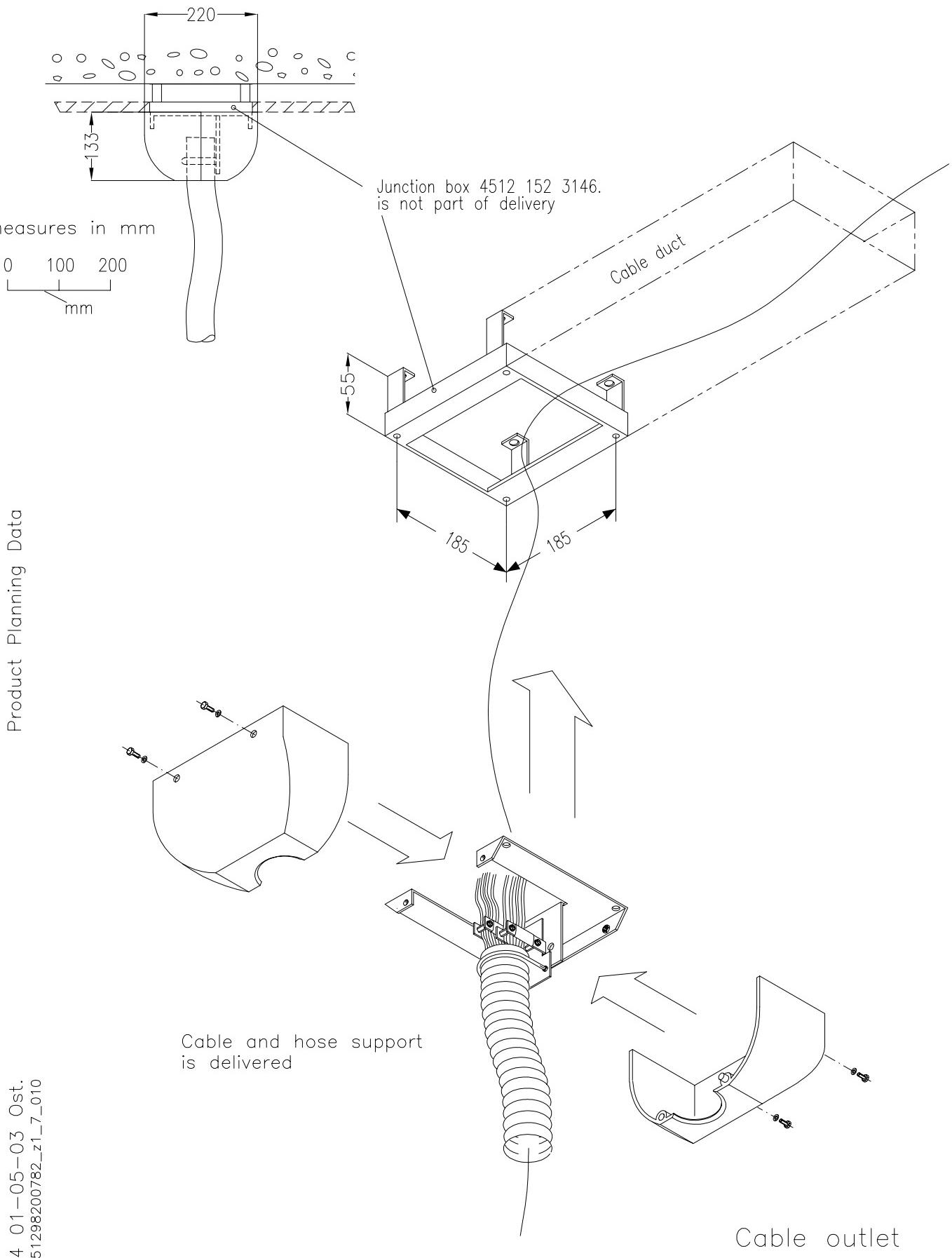
BuckyDiagnost FS IsoRAD
Mechanical dimensions

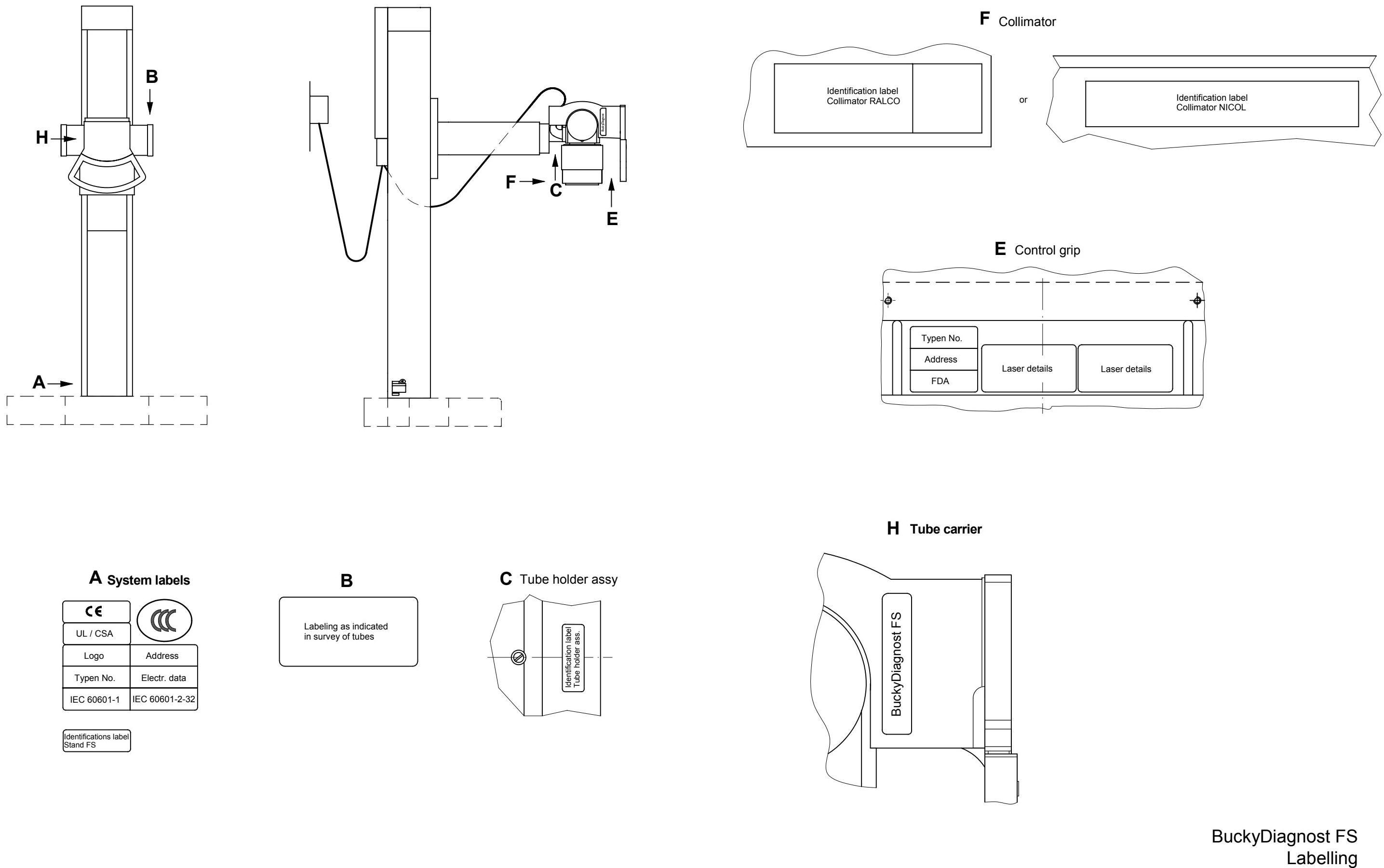


A3 04-09-07 Schr.

BuckyDiagnost FS Iso RAD
Floor rail 4900mm
Mechanical dimensions





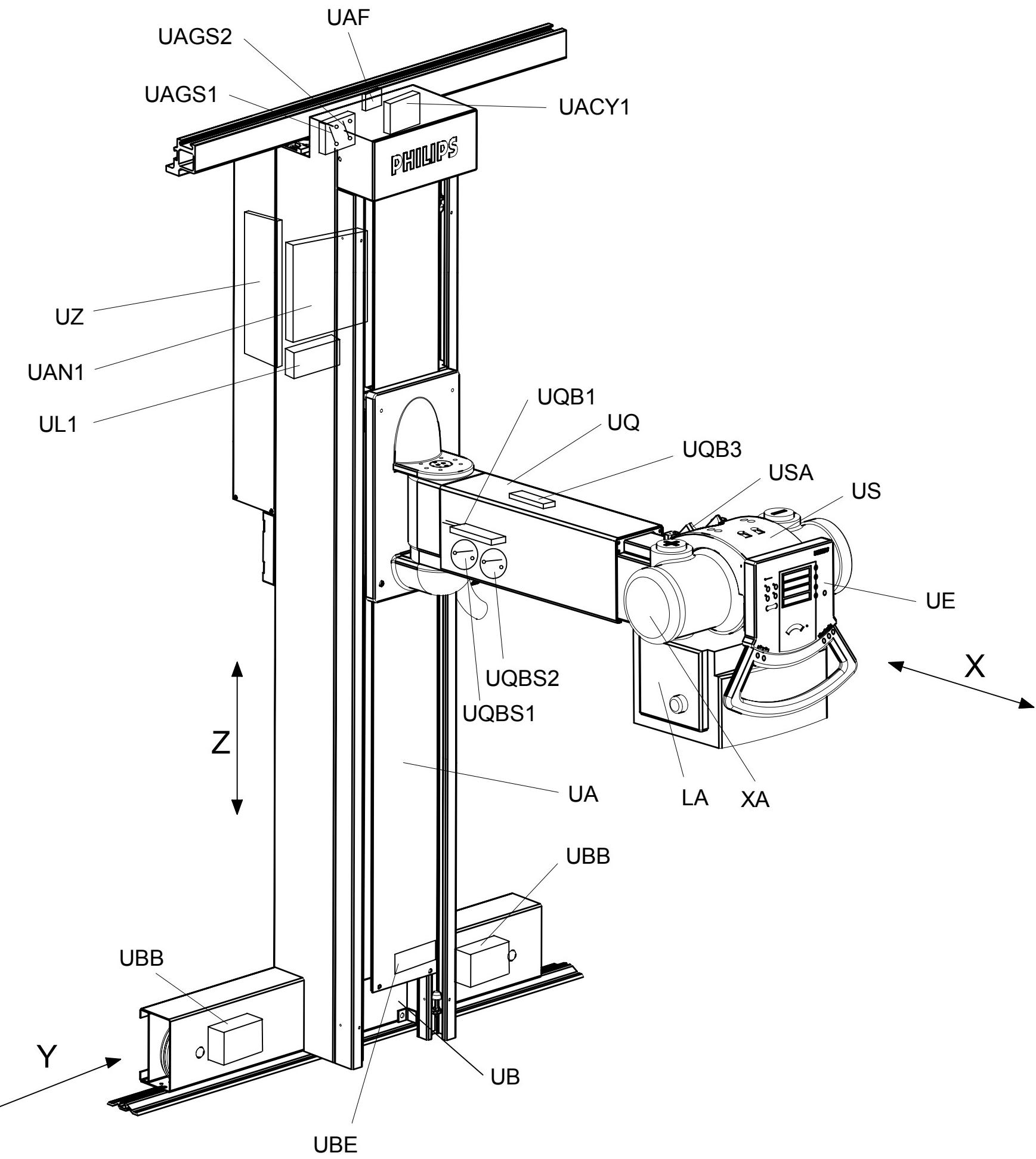


Schematic diagrams

BuckyDiagnost FS IsoRAD Survey of units	Z1-1
BuckyDiagnost FS Power supply UAN 1	Z1-2
BuckyDiagnost FS IsoRAD with sensing system cabling	Z1-3
BuckyDiagnost FS detailed schematic	Z1-4
BuckyDiagnost family control handle and automatic collimator Nicol	Z1-5
UZ Coding field 4512 108 07385	Z1-7

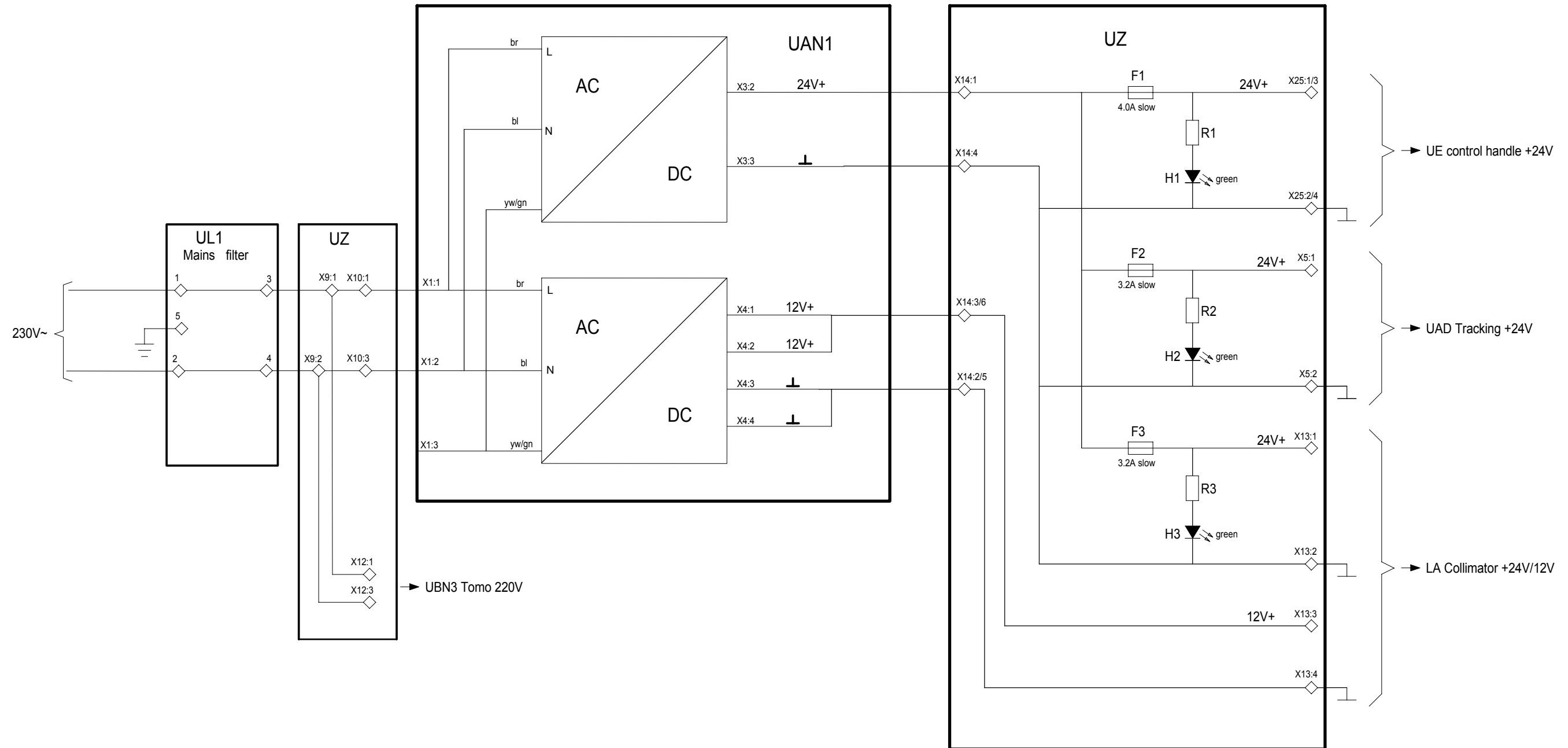
Wiring diagrams

BuckyDiagnost FS IsoRAD Earthing diagram	Z2-1
BuckyDiagnost FS IsoRAD Wiring diagram	Z2-2
BuckyDiagnost FS CAN bus cable	Z2-3
BuckyDiagnost family control handle with display and SID laser	Z2-2.2

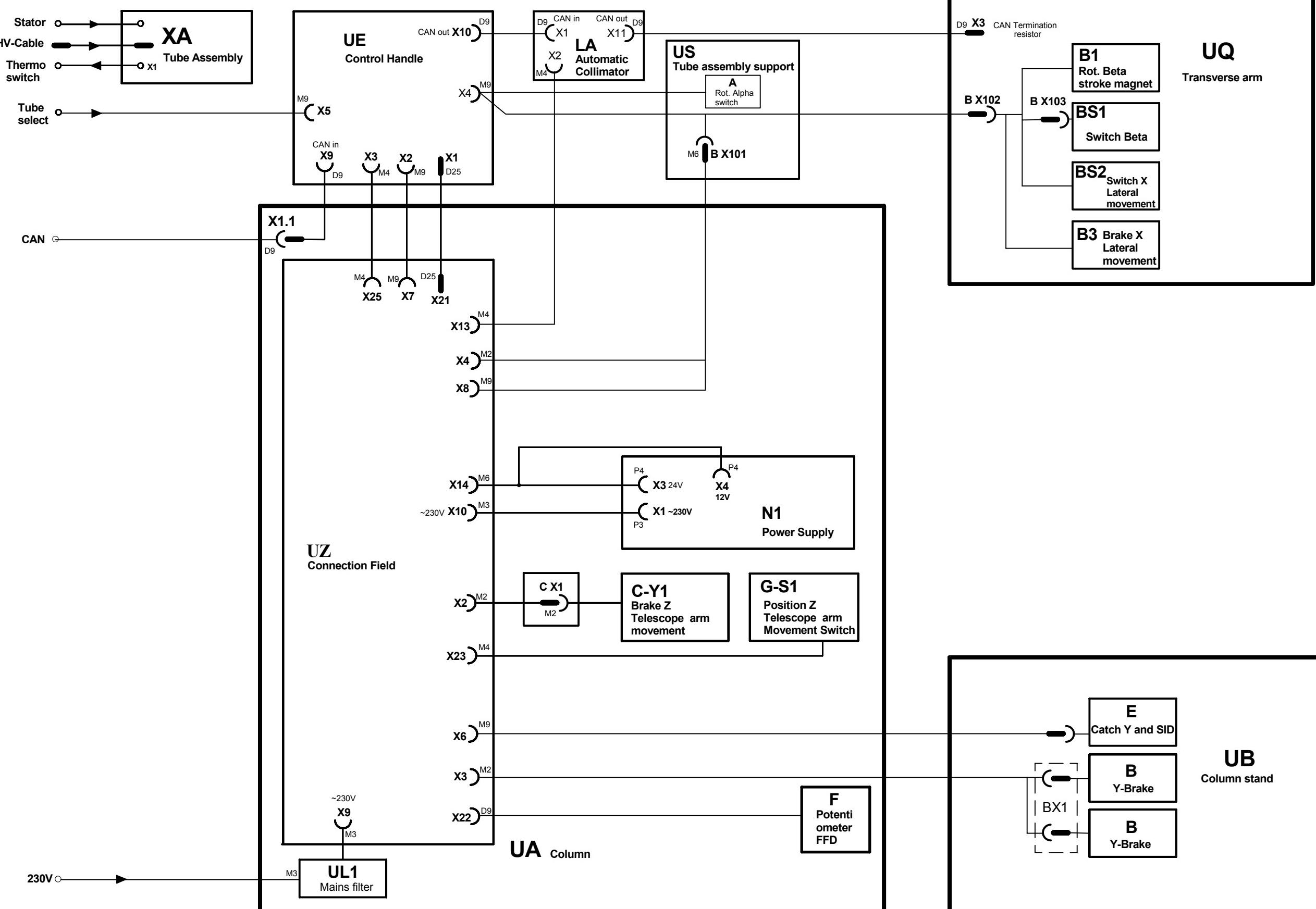


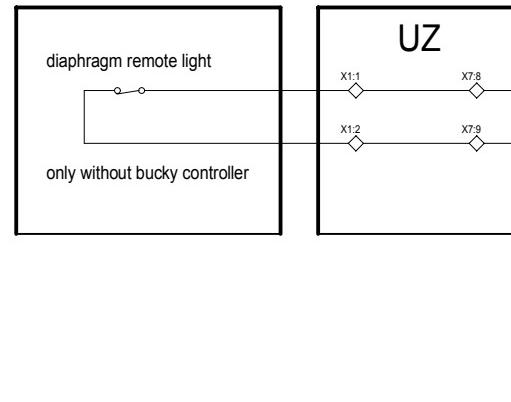
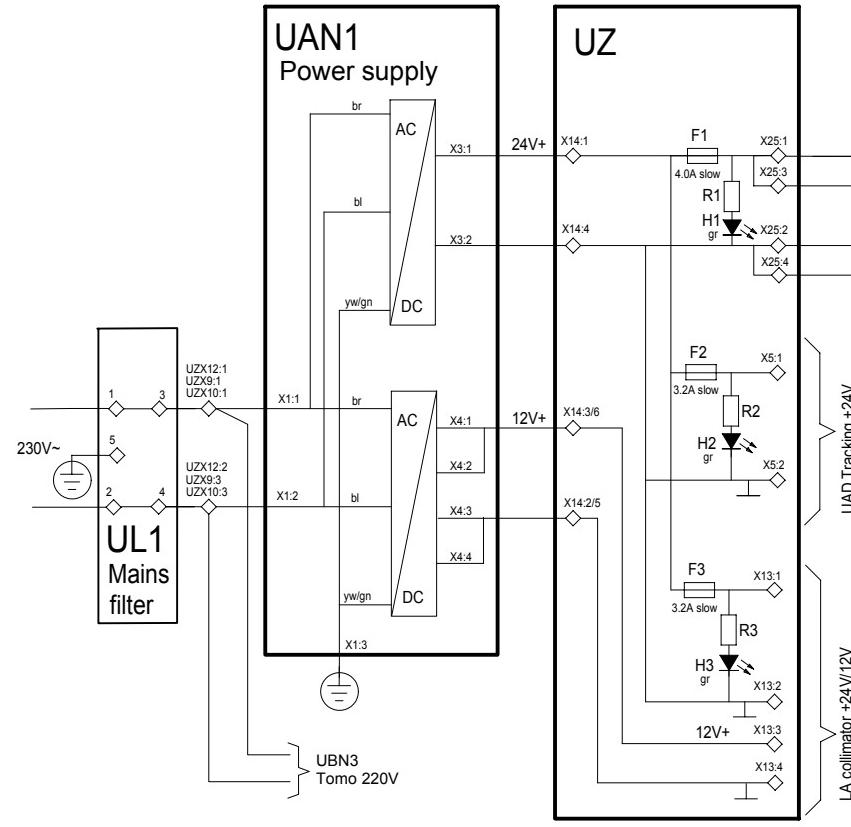
LA	= Collimator
UA	= Column
UACY1	= Brake telescope movement (z-direction)
UAF	= FFD Potentiometer (z-direction)
UAGS1	= Switch vertical SID position (z-direction)
UAGS2	= Switch Tomo working position (z-direction)
UAN1	= Power supply
UB	= Column stand
UBB	= Brake longitudinal (Y-direction)
UBE	= Catch and SID position switches
UE	= Control handle
UL1	= Power filter
UQ	= Transverse/ Telescope arm
UQB1	= Stroke magnet for beta rotation
UQBS1	= Switch for beta rotation position
UQB3	= Brake for lateral movement (x-direction)
UQBS2	= Position switch for lateral movement (x-direction)
US	= Tube housing support
USA	= Switch for alpha rotation position
UZ	= PCB connection board
XA	= Tube

BuckyDiagnost ISO RAD
Survey of units



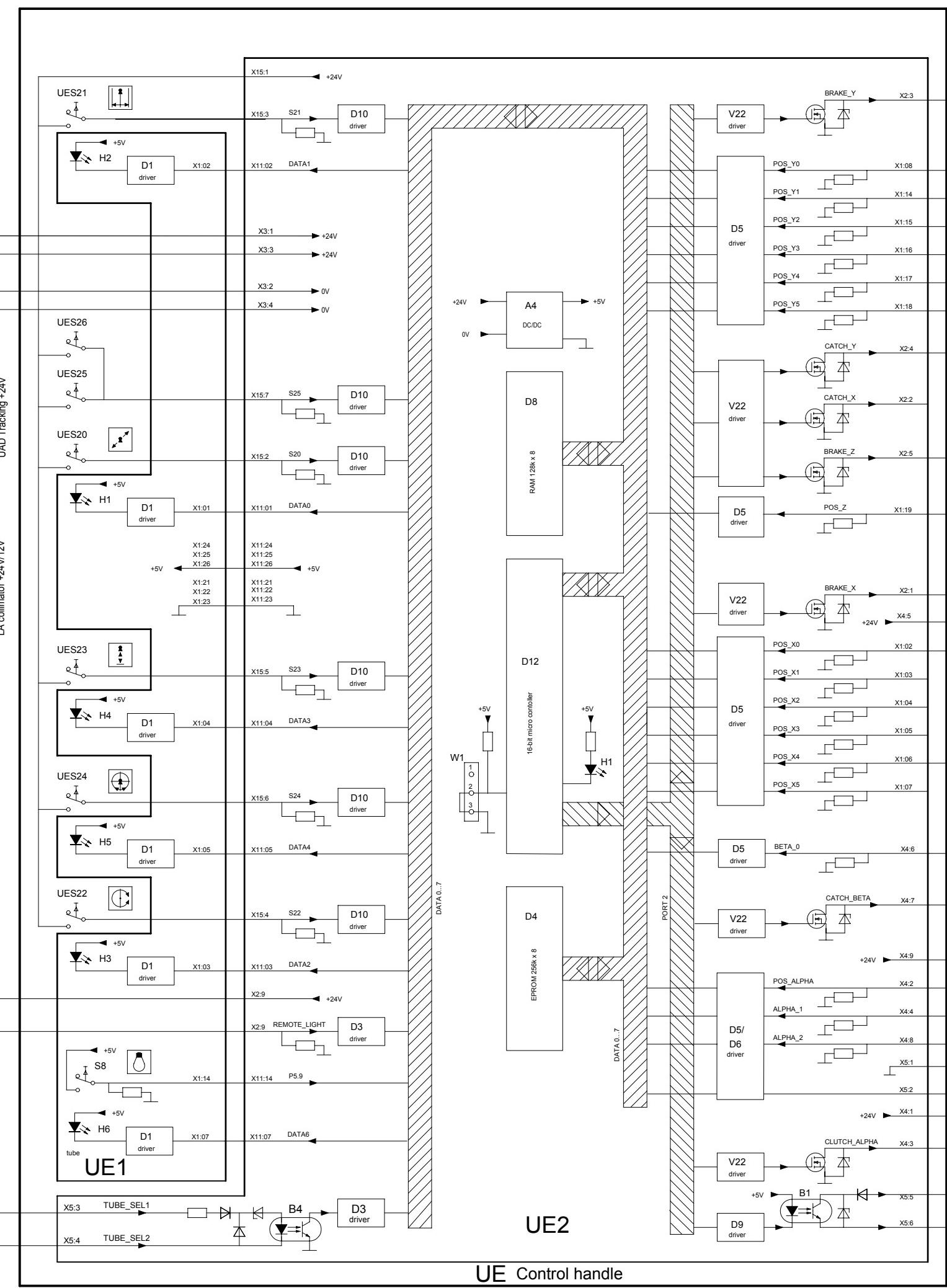
BuckyDiagnost FS
Power supply UAN1

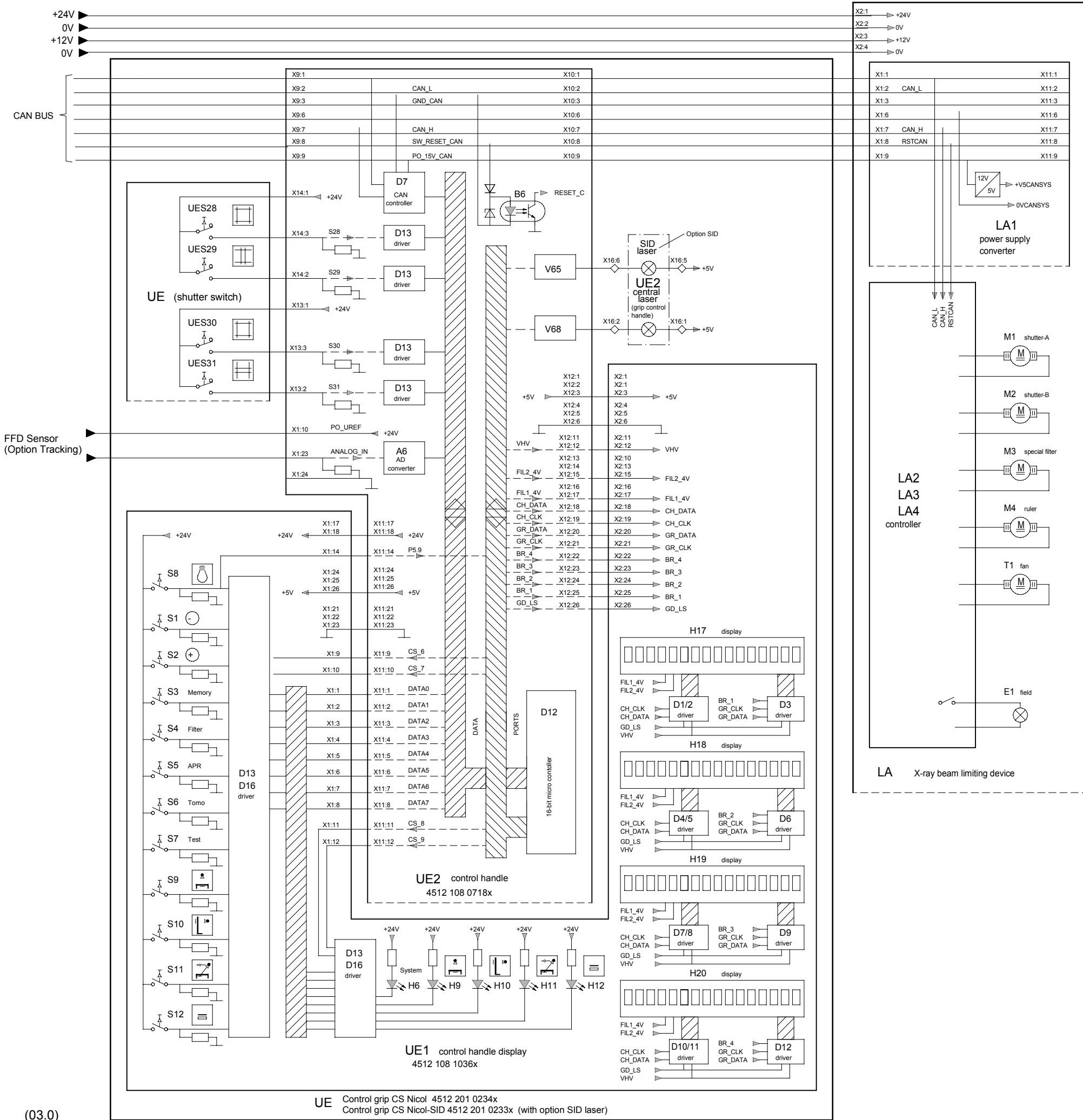




Generator
PO 26V
GND

(04.0)

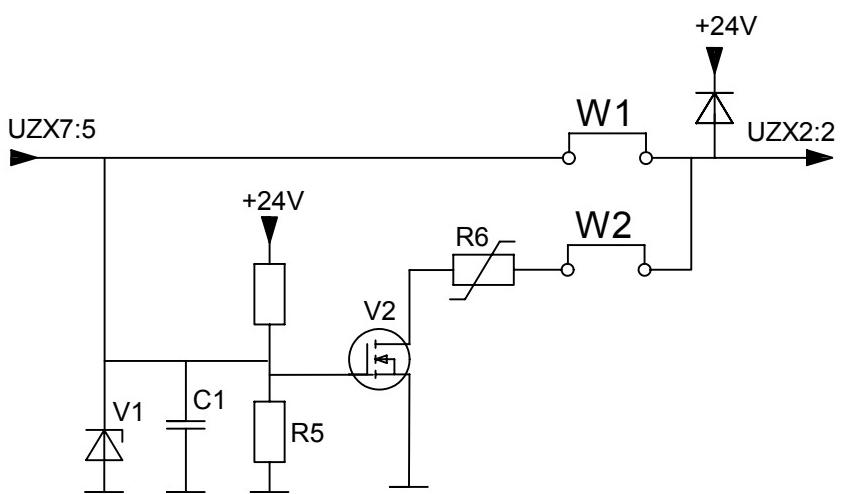
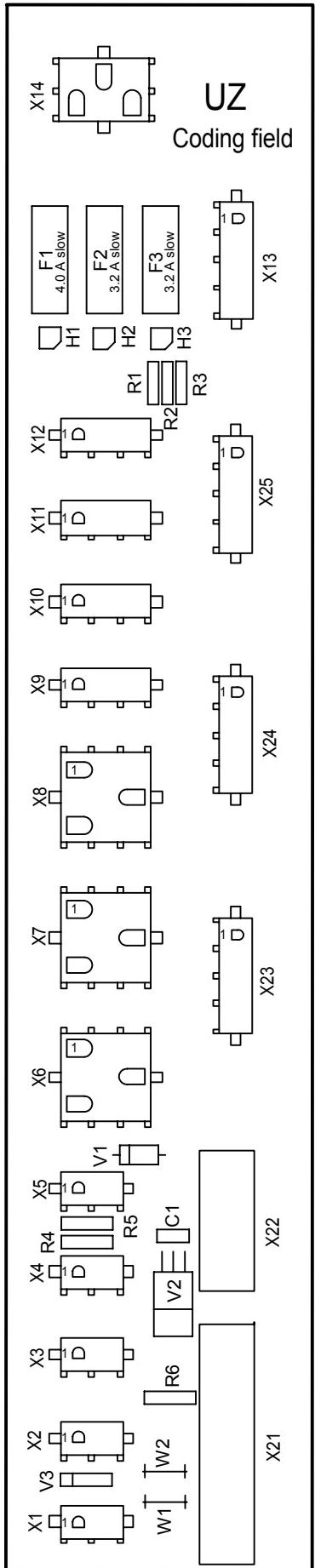


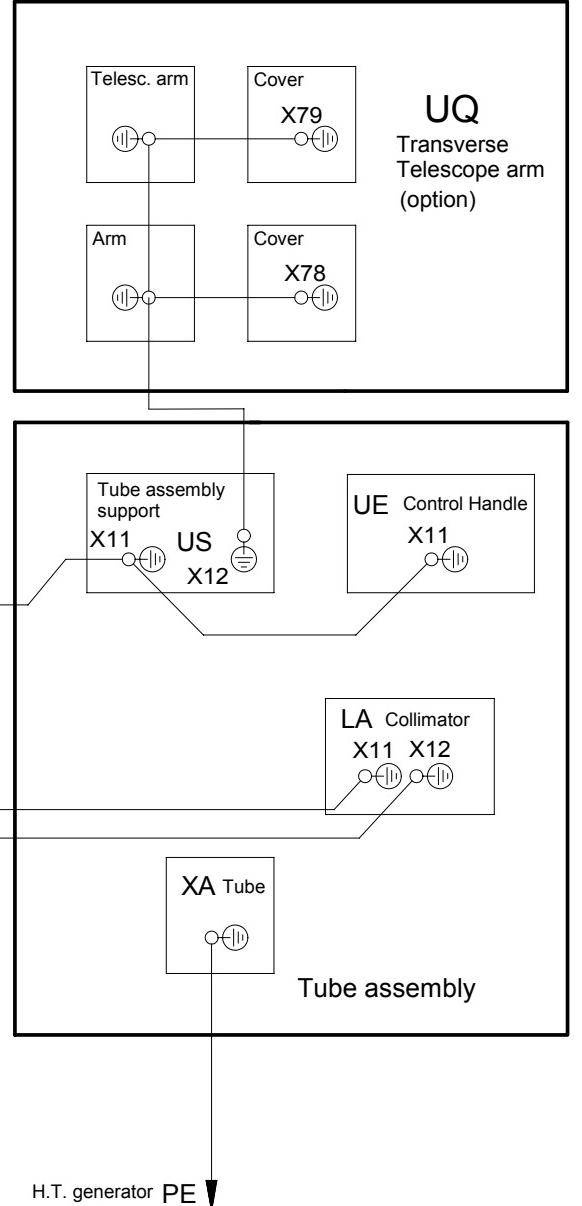
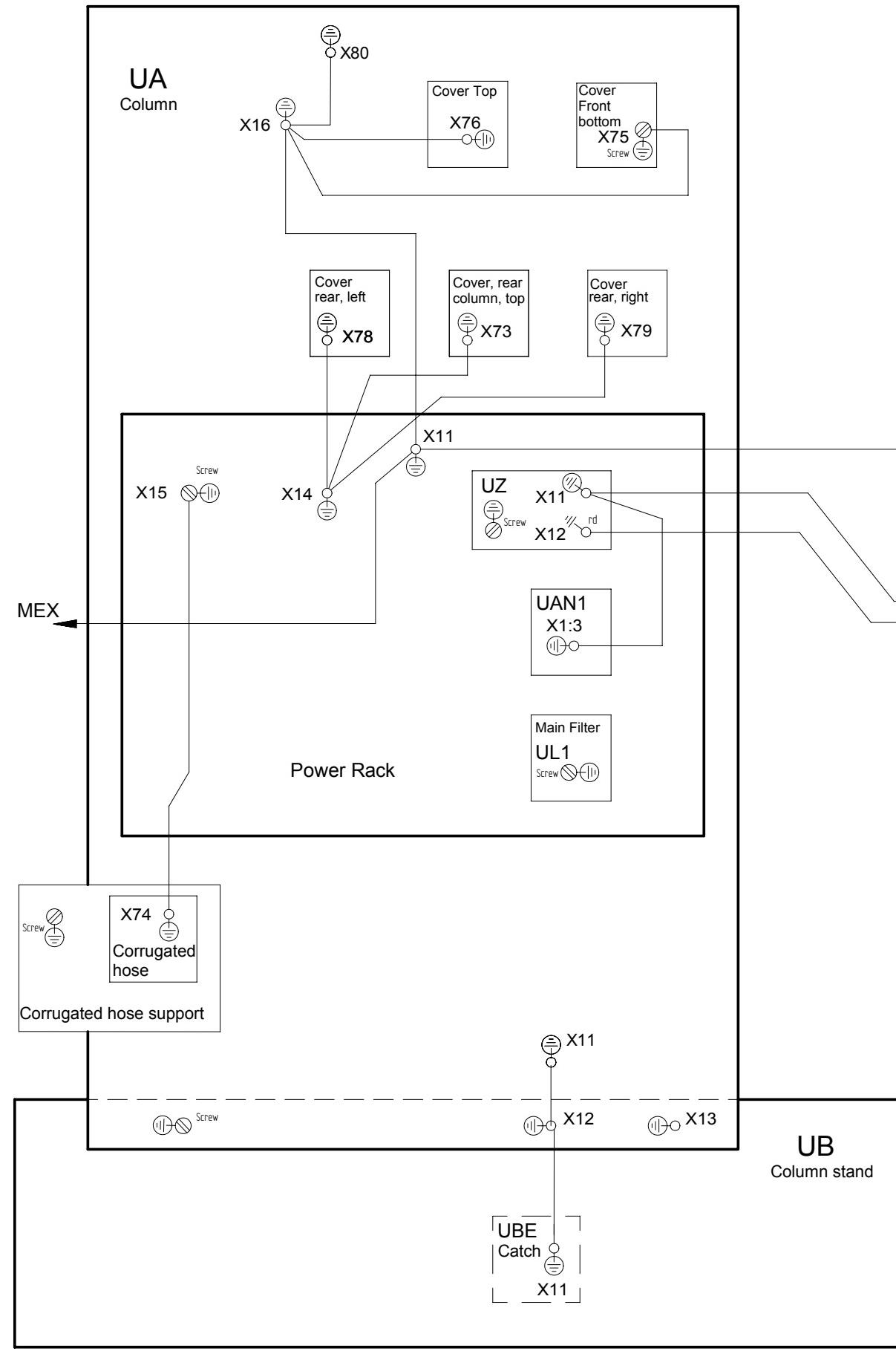
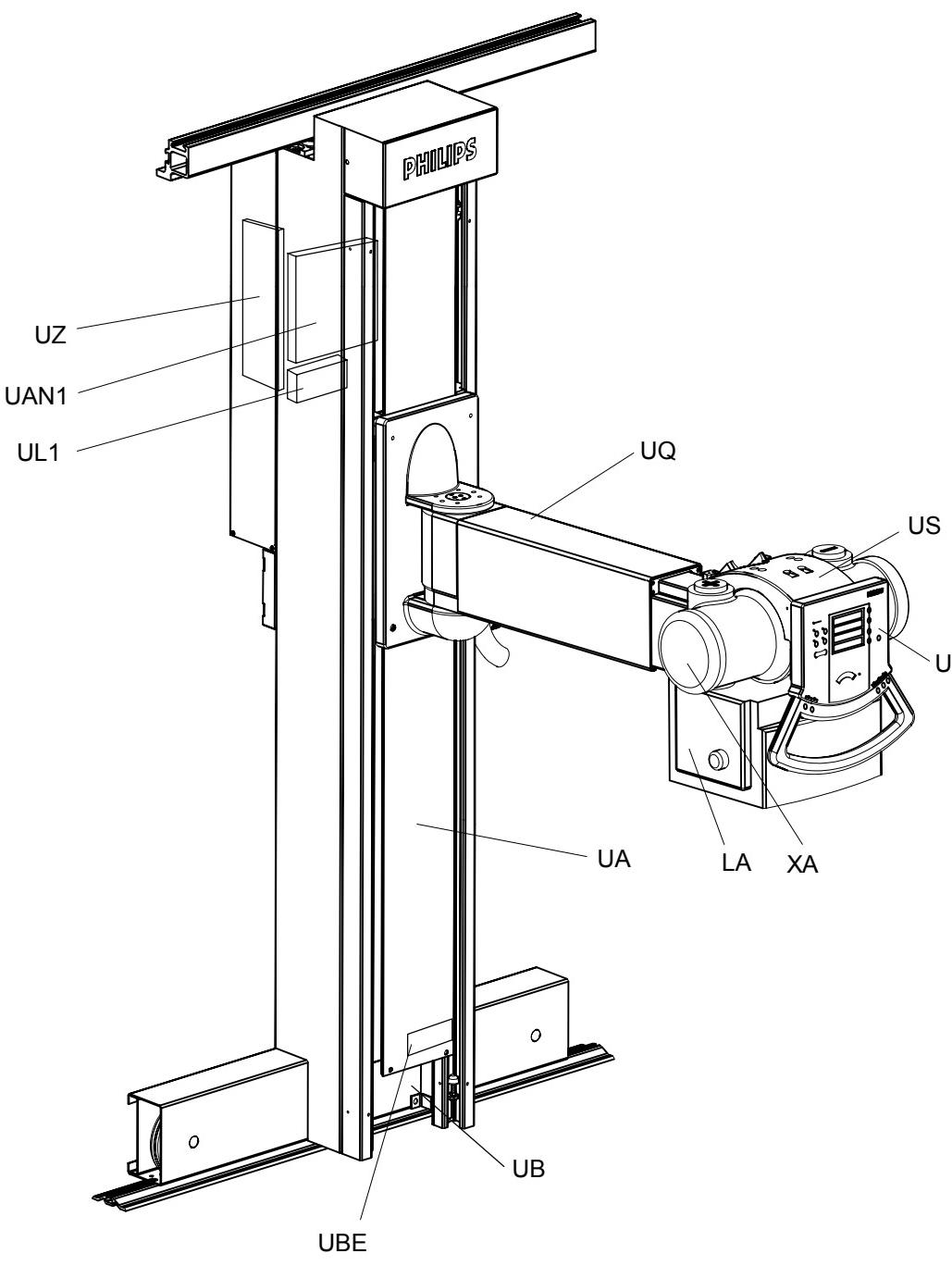


BuckyDiagnost family

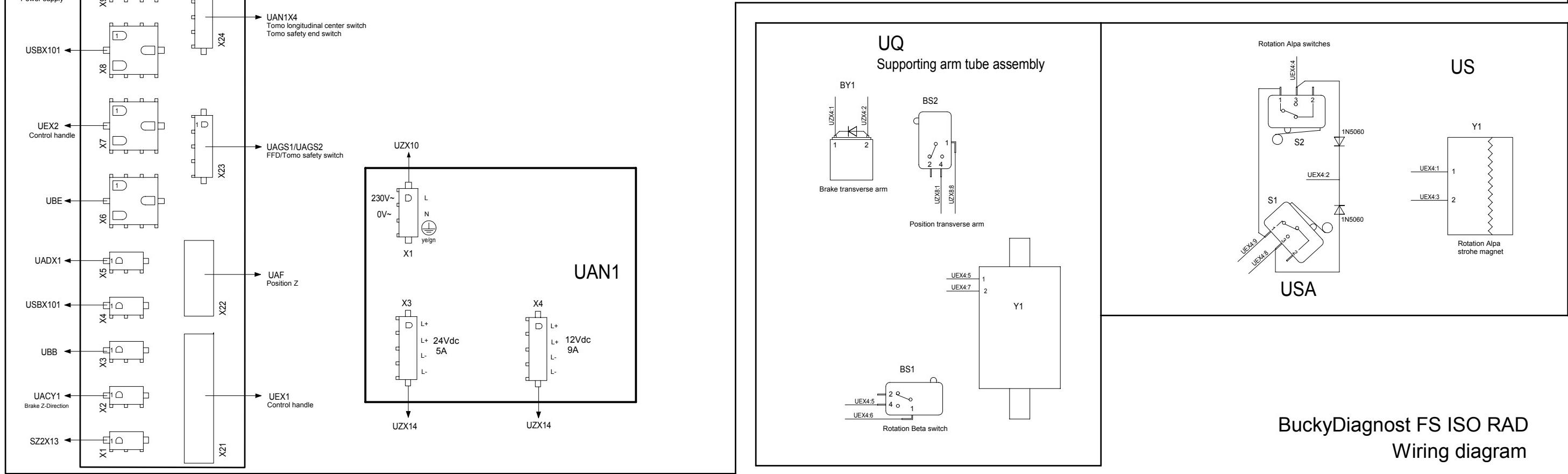
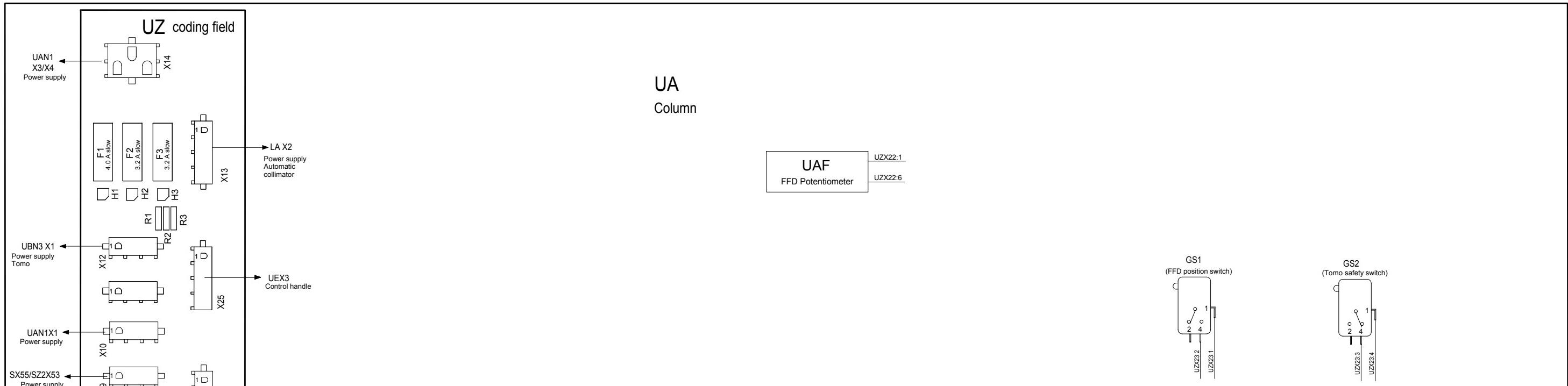
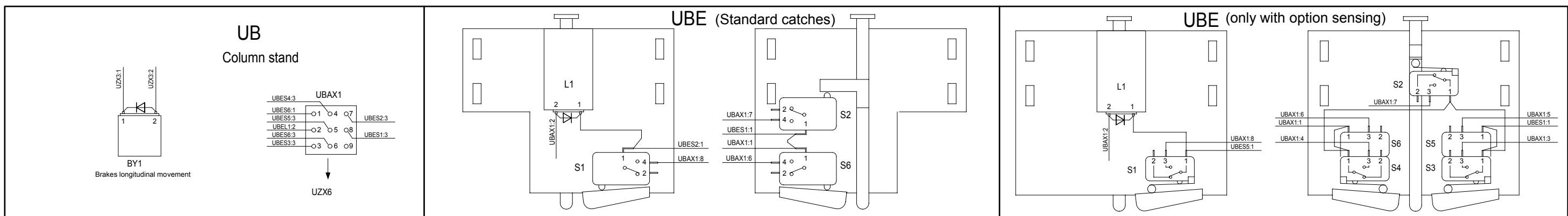
Control handle

and automatic collimator Nicol



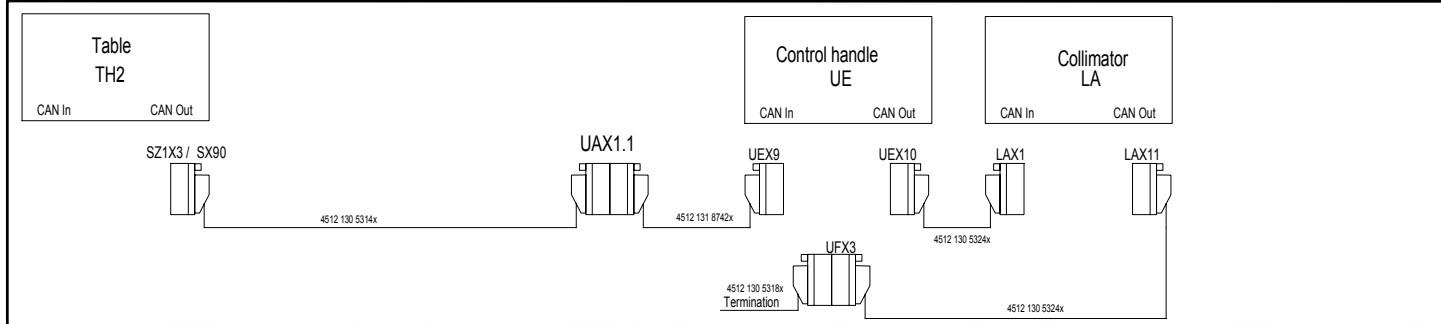


BuckyDiagnost FS ISO RAD
Earthing diagram

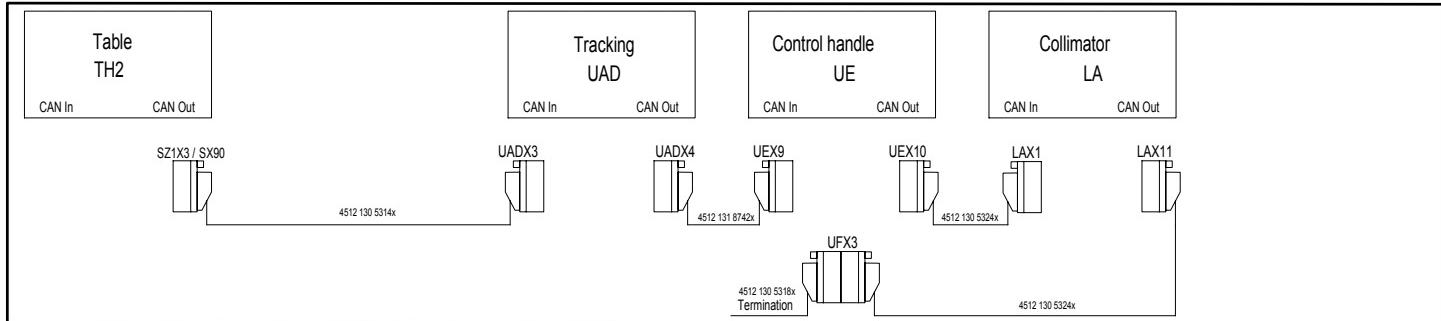


CAN bus cable connection

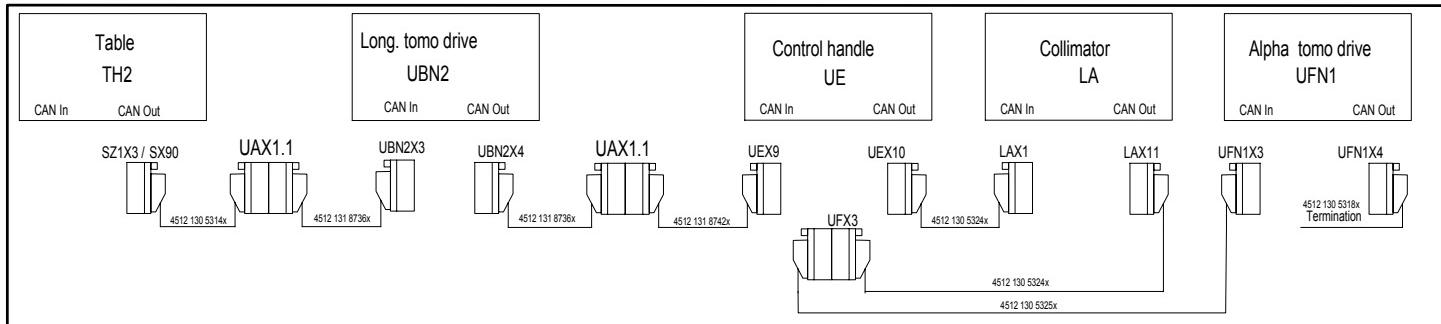
1) Sensing



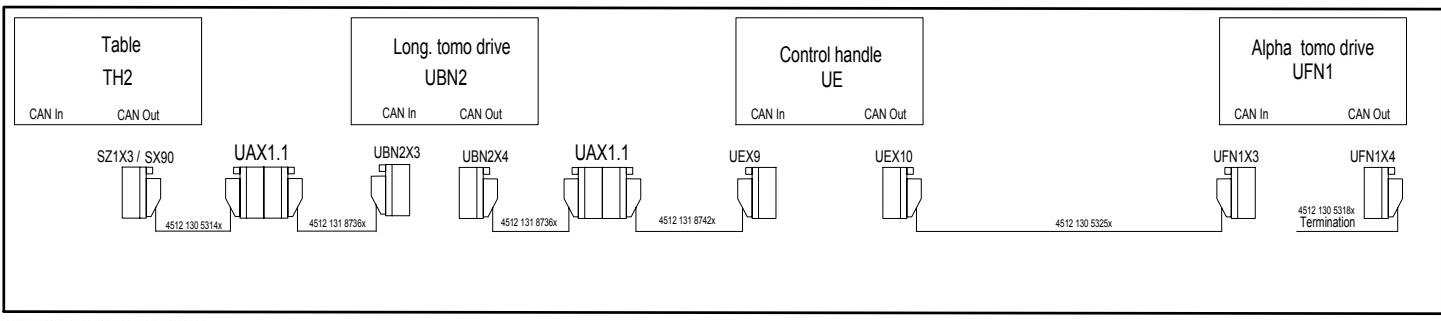
2) Sensing / Tracking



3) Sensing / Tomo



4) Tomo



5) Sensing / Tracking / Tomo

